Proceedings of the Institution of Mechanical Engineers

Volume 197, 1983

The letter preceding each page number refers to the relevant Part of the Proceedings as follows:

Part A Power and Process Engineering

Part B Management and Engineering Manufacture

Part C Mechanical Engineering Science

Author Index

Abdul Azim, A A The role of impregnants in determining the behaviour of mechanical carbon sealing rings A 45

Adye, A M The role of research in man's use of the oceans A 79

Alexander, J D Structural high temperature materials—a view with a future C 75

Alkidas, A C Heat losses from a divided-chamber diesel engine C 151

Allsopp, M R The design and development of a new range of large a.c. motor B 161

Armour, D B The use of photogrammetry in piping design (*discussion*) A 297

Arthur, G F Development of a conveyorized coal feeder B 111

Bahgat, B M An approach for dynamic analysis of mechanical systems with multiple clearances using Lagrangian mechanics C 17

On the dynamic analysis of planar mechanisms with multiple clearances C 89

Ball, D R Blockage corrections for rectangular flat plates mounted in an open jet wind tunnel C 259

Barlow, Sir William The acceleration of change in British engineering B 1

Beatt, R J I Two-shift operation of 500 MW boiler/turbine generating units A 247

Bennett, H W Aero engine development for the future A 149

Birch, W L Two-shift operation of 500 MW boiler/turbine generating units A 247

Bottomley, C Advanced computer aided engineering and manufacturing B 81

Bouley, J High speed trains throughout the world B 43

Bracewell, P A The use of photogrammetry in piping design A 125; (*discussion*) A 297; (*author's reply*) A 300

Cariou, J P Heat transformers: present state of a new technology A 71

Challis, E G A complete steel shelf from fifteen tonne coils every three seconds B 91

Cloke, D W Integrating an advanced CAD/CAM system with shipbuilding technology B 219

Cockbill, K W Vehicle build sequence control for Metro production B 169

Cohen, G Heat transformers: present state of a new technology A 71

Cole, R M Heat losses from a divided-chamber diesel engine C 151

Curtis, M E The design, development and manufacture of a new and unique tennis racket B 71

Davie, H Microcomputer control of hydro turbines A 91

Davies, A J Driving axles into the eighties B 123

Desty, D H No smoke with fire A 159

Dowson, D The piezo-viscous fluid, rigid solid regime of lubrication C 43

Driels, M R Experiment verification and measurement of recompaction waves induced by bulk cavitation C 141

Dunn, J F The piezo-viscous fluid, rigid solid regime of lubrication C 43

Edge, K A The measurement of the fluid borne pressure ripple characteristics of hydraulic components B 247

Eldighidy, S M The role of impregnants in determining the behaviour of mechanical carbon sealing rings A 45

Evans, H P Analysis of elastohydrodynamic lubrication of elliptical contacts with rolling along the major axis C 209

Farid, M U An investigation into distribution parameters of steam turbine blade and wheel vibration measurements C 117

Fauvel, R Coal-fired Stirling engines for railway locomotive and stationary power applications A 233

Future coal-burning Stirling engines A 37

Fujita, H Development of a large-bored Stirling engine in Japan A 107

Gabbett, B R Development of a conveyorized coal feeder B 111

Gardiner, G A Development of a conveyorized coal feeder B 111

Glew, C N The design and development of a new range of large a.c. motors B 161

Glöckner, H J R Tribology aspects considered when selecting rolling bearings for the automobile industry C 1

Gooch, I D Computer aided engineering: its effectiveness in avionics B 101

Goodwin, M J Controlling the dynamic characteristics of a hydrostatic bearing by using a pocket-connected accumulator C 255

Goraj, Z J Comparison between analytical and vectorial methods of the synthesis of equations of motion C 265

Gostling, R J The interaction of pantograph and overhead equipment: practical applications of a new theoretical method C 61

Goto, H Development of a large-bored Stirling engine in Japan A 107

Goto, T Development of a large-bored Stirling engine in Japan A 107

Grant, N F Microcomputer control of hydro turbines A 91

Greenslade, D Advanced computer aided engineering and manufacturing B 81

Greenwood, J H Increased manufacturing effectiveness in the production of steam generating equipment B 117

Greitzer, E M Non-uniform flows in axial compressors due to tip clearance variation C 173

© IMechE 1983

Grewal, S S On the inherent compensation in an air journal bearing C 275
Gupta, B K Static and dynamic properties of oil films in displaced centres elliptical bearings C 159
Gustafson, R Future coal-burning Stirling engines A 37

Haines, R C The design, development and manufacture of a new and unique tennis racket B 71
Hamilton, G M Explicit equations for the stresses beneath a sliding spherical contact C 53; (errata) C 282
Hannam, R G Design for manufacture using a CAD/CAM system—a methodology for turned parts B 187
Hardisty, H An experimental investigation into the effect of changes in the geometry of a slot nozzle on the heat transfer characteristics of an impinging air jet C 7
Harper, J L Increased manufacturing effectiveness in the production of steam generating equipment B 117
Harries, G M Vehicle build sequence control for Metro production B 169
Harrop, S Driving axles into the eighties B 123
Haseler, L E The sensitivity of heat exchanger calculations to uncertainties in the physical properties of the process fluids A 171
Hellewell, D S Operational requirements of light rail vehicles B 55
Hinton, S E Two-shift operation of 500 MW boiler/turbine generating units A 247
Hobbs, A E W The interaction of pantograph and overhead equipment: practical applications of a new theoretical method C 61
Hobbs, F S Advanced computer aided engineering and manufacturing B 81
Hodgson, D C A technique for the prediction of the noise field from an arbitrary vibrating machine C 189
Holland, M Stress in an internally pressurized thin rectangular prismatic duct C 71
Holmes, K The performance potential of limited cooled diesel engines A 197
Hooke, C J Controlling the dynamic characteristics of a hydrostatic bearing by using a pocket-connected accumulator C 255
The effects of non-flatness on the performance of slippers in axial piston pumps C 239
Horlock, J H Non-uniform flows in axial compressors due to tip clearance variation C 173
Howard, D The differential compound engine—a new integrated engine transmission system concept for heavy vehicles A 209
Howard, D F Available and projected trends in urban rail vehicles B 49
Howard, R A Advances in the manufacture of aerospace fasteners B 177
Hughes, K G Plant floor information systems via programmable controller/computer networks A 27
Humphreys, H R O An integrated computer aided engineering system for prototypes and tooling of automotive parts B 35

Iwabuchi, M Development of a large-bored Stirling engine in Japan A 107

Jack, R G N Improvements in the construction of fractional horsepower electric motors B 127
Jacobson, M A A comparison of US, West European, UK and Japanese performance 1977–80 B 19
Jain, S C A study of elastohydrodynamic lubrication of a centrally loaded 120° arc partial bearing in different flow regimes C 97
Jenny, E Pressure wave supercharging of passenger car diesel engines A 113
Johnson, E W Coal-fired Stirling engines for railway locomotives and stationary power applications A 233

Kaczmarek, J Activities of the Polish Society of Mechanical Engineers and Technicians (SIMP) in relation to the principles of economic reform B 157
Kakoullis, Y P The effects of non-flatness on the performance of slippers in axial piston pumps C 239
Kalaugher, P G The use of photogrammetry in piping design (*discussion*) A 299
Kamelmacher, E Design and performance of silicon carbide product lubricated bearings A 257
Kanzaka, M Development of a large-bored Stirling engine in Japan A 107
Kelly, M Two-shift operation of 500 MW boiler/turbine generating units A 247
Kentfield, J A C Coal-fired Stirling engines for railway locomotive and stationary power applications A 233
Kilicay, O Determination of bearing deflections C 277
Kilmartin, B R Selecting advanced machine tools by a systems approach based on key machined components B 261
The application of a production database to select key machined components B 255
Klement, U R The use of photogrammetry in piping design A 125; (*discussion*) A 297
Krishman, V Free and forced motion of a gyropendulum C 109
Response of a gyropendulum subject to parametric excitation C 233
Kushiyama, T Development of a large-bored Stirling engine in Japan A 107
Kyrtatos, N P The performance potential of limited cooled diesel engines A 197

Laing, P D The efficient use of energy in packaged air compressor sets A 269
Larowski, A Systematic procedure for selection of heat exchangers A 51
Lee, R W A complete steel shelf from fifteen tonne coils every three seconds B 91
Automated storage and handling of cores and moulds in a foundry B 7
Leonard, R Selecting advanced machine tools by a systems approach based on key machined components B 261
The application of a production database to select key machined components B 255
Lesner, W T Plant floor information systems via programmable controller/computer networks A 27
Lewis, G K A simplified procedure for predicting the performance of inherently compensated aerostatic thrust bearings C 145
Lewis, R G H Vehicle build sequence control for Metro production B 169
Lloyd, R A Triple epicyclic four-clutch six-ratio change-speed systems C 127; (corrigenda) C 212

MacGregor, I K Mount Newman—a keystone development B 197
McHugh, J The engineering of the national transmission system of the British Gas Corporation A 179
McIntyre, J Increased manufacturing effectiveness in the production of steam generating equipment B 117
Majumdar, B C Static axial characteristics of aerostatic annular porous thrust bearings with tilt C 83
Stiffness and damping of externally pressurized gas journal bearings with porous inserts C 25
Steady-state characteristics of aerostatic porous rectangular thrust bearings incorporating the effects of velocity slip, anisotropy and tilt C179; (errata) C 282

© IMechE 1983

Mann, T J The design and development of a new range of large a.c. motors B 161
Marshall, A G Microcomputer control of hydro turbines A 91
Marshall, P H The Ford Cargo B 61
Masding, H Construction of power stations designed and built as single units A 1
Maunder, L Free and forced motion of a gyropendulum C 109
Metcalfe, R Integrating an advanced CAD/CAM system with shipbuilding technology B 219
Miller, C T Computer aided engineering: its effectiveness in avionics B 101
Morgan, D R Computer aided engineering: its effectiveness in avionics B 101
Mullaney, F M The design, development and manufacturing of a new and unique tennis racket B 71

Okada, M Development of a large-bored Stirling engine in Japan A 107
Osman, M O M An approach for dynamic analysis of mechanical systems with multiple clearances using Lagrangian mechanics C 17
On the dynamic analysis of planar mechanisms with multiple clearances C 89
Owen, I Investigation of air driven ejectors at elevated temperatures C 167
Owen, R G The sensitivity of heat exchanger calculations to uncertainties in the physical properties of the process fluids A 171

Parrott, E Development and application of continuous dress creep feed grinding B 231
Penny, J E T Controlling the dynamic characteristics of a hydrostatic bearing by using a pocket-connected accumulator C 255
Perry, A J A complete steel shelf from fifteen tonne coils every three seconds B 91
Plummer, J C S Design for manufacture using a CAD/CAM system—a methodology for turned parts B 187
Pulley, M J Two-shift operation of 500 MW boiler/turbine generating units A 247

Rabah, M A The role of impregnants in determining the behaviour of mechanical carbon sealing rings A 45
Ramsden, G The design, development and manufacture of a new and unique tennis racket B 71
Rao, N S Static axial characteristics of aerostatic annular porous thrust bearings with tilt C 83
Steady-state characteristics of aerostatic porous rectangular thrust bearings incorporating the effects of velocity slip, anisotropy and tilt C 179; (errata) C 282
Rees, D W A A theory of non-linear anisotropic hardening C 31
Rojey, A Heat transformers: present state of a new technology A 71
Rufus, D Driving axles into the eighties B 123

Sadek, M M A technique for the prediction of the noise field from an arbitrary vibrating machine C 189
Salisbury, A G Current concepts in centrifugal pump hydraulic design A 221
Sanders, A J A new concept of machine tool production B 183
Sankar, T S An approach for dynamic analysis of mechanical systems with multiple clearances using Lagrangian mechanics C 17
On the dynamic analysis of planar mechanisms with multiple clearances C 89
Sardesai, R G The sensitivity of heat exchanger calculations to uncertainties in the physical properties of the process fluids A 171
Sayers, A T Blockage corrections for rectangular flat plates mounted in an open jet wind tunnel C 259
Shidle, R W Analysis of elastohydrodynamic lubrication of elliptical contacts with rolling along major axis C 209
Shunmugam, M S Effect of top-relief and rake angles on the gear shaping cutter profile C 249
Simms, M G The design and development of a new range of large a.c. motors B 161
Singh, A Static and dynamic properties of oil films in displaced centres elliptical bearings C 159
Singh, D V A study of elastohydrodynamic lubrication of a centrally loaded 120° arc partical bearing in different flow regimes C 97
Singh, K H Static axial characteristics of aerostatic annular porous thrust bearings with tilt C 83
Steady-state characteristics of aerostatic porous rectangular thrust bearings incorporating the effects of velocity slip, anisotropy and tilt C 179; (errata) C 282
Sinhasan, R A study of elastohydrodynamic lubrication of a centrally loaded 120° arc partial bearing in different flow regimes C 97
Skinner, L. E Advances in the manufacture of aerospace fasteners B 177
Small, B W Wealth generation—our essential task B 131
Sparling, L G M The evaluation of load and torque in hot flat rolling from slip line fields A 277
Spence, J On propagating buckles and their arrest in sub-sea pipelines A 139
Srinivasan, N Effect of top-relief and rake angles on the gear shaping cutter profile C 249
Srinivasan, V Future coal-burning Stirling engines A 37
Coal-fired Stirling engines for railway locomotives and stationary power applications A 233
Stanojevic, M A simplified procedure for predicting the performance of inherently compensated aerostatic thrust bearings C 145
Stanway, R Identification of linearized squeeze-film dynamics using synchronous excitation C 199
Steel, W J M On propagating buckles and their arrest in sub-sea pipelines A 139
Stone, B J The sources of damping in rolling element bearings under oscillating conditions C 225
Sutton, R Valid human operator control models for closed loop design B 237
Swann, K Developing industrial managers in the 1980s B 209

Tarabad, M Engine transmission systems for the heavy goods vehicle and the passenger carrying bus A 97
The differential compound engine—a new integrated engine transmission system concept for heavy vehicles A 209
Taylor, C M The piezo-viscous fluid, rigid solid regime of lubrication C 43
Taylor, M A Systematic procedure for selection of heat exchangers A 51
Thompson, J M Driving axles into the eighties B 123
Turner, J L A complete steel shelf from fifteen tonne coils every three seconds B 91

van Benthem, J Future coal-burning Stirling engines A 37

Walford, T L H The sources of damping in rolling element bearings under oscillating conditions C 225
Walker, G Coal-fired Stirling engines for railway locomotive and stationary power applications A 233
Future coal-burning Stirling engines A 37
Wallace, F J Engine transmission systems for the heavy goods vehicle and the passenger carrying bus A 97

© IMechE 1983

The differential compound engine—a new integrated engine transmission system concept for heavy vehicles A 209
Wallace, T A H Computer aided engineering: its effectiveness in avionics B 101
Watson, N Resonant intake and variable geometry turbocharging systems for a V8 diesel engine A 27
The performance potential of limited cooled diesel engines A 197
Wheeler, E Development of a conveyorized coal feeder B 111
White, G Design study of a 375 kW helicopter transmission with split-torque epicyclic and bevel drive stages C 213
White, N A Engineering management—the managerial tasks of engineers B 143
Whitehouse, D J An easy to measure average peak/valley parameter for surface finish C 205
Wills, K F Advanced computer aided engineering and manufacturing B 81
Wing, T J The measurement of the fluid borne pressure ripple characteristics of hydraulic components B 247
Winning, D J Microcomputer control of hydro turbines A 91
Winterbone, D E Design and development trends in medium-speed diesel engines to the year 2000 AD A 287
Wright, G R L Two-shift operation of 500 MW boiler/turbine generating units A 247
Wright, W Two-shift operation of 500 MW boiler/turbine generation units A 247

Zumstein, B Pressure wave supercharging of passenger car diesel engines A 113

© IMechE 1983

Subject Index

a.c. motors
  commercial preparation B 166
  design concepts B 161, B 162, B 163, B 164, B 165
  product costs B 162
  product specification B 161
  production engineering B 166
  prototype manufacture B 165
Acceleration of change B 1
Acquisitions in acceleration of change B 5
Adaptive models B 239
Aero engine
  cost of ownership A 149
  development for the future A 149
  integration with airframe A 155
  long-term possibilities A 155
  military A 155
Aerospace fasteners, manufacture of B 177
Air compressors. *See* Compressors
Aircraft
  equations of motion C 270, C 272
  Sea Harrier VTOL B 237
Angular momentum, generalized principle of C 266
Archimedes SS A 80
Ash handling plant A 20
Astrology, fatigue failure in powder C 80
Austin Metro, vehicle build sequence control B 169
  computer configuration B 171
  design objectives B 172
  model mix control B 172
  order priority B 174
  painted body stores B 169, B 174
  system benefits B 174, B 175
  vehicle build sequencing sub-systems B 172
Australia, Mount Newman iron ore deposit B 197
Automated storage and handling of cores and moulds. *See* Foundry cores/moulds
Automation of aerospace fasteners B 180
Automobile industry
  tribology aspects of rolling bearings C 1
  avoidable costs B 23
  buffer stocks B 23
  computer aided engineering B 35
  energy use in material processing B 24
  factory dispersal B 24
  performance comparisons B 19
  production costs, average wages/car worker B 21
  steel production, Japanese achievements B 24
  UK position B 23
Avionic components, computer aided engineering B 101
Axle manufacture
  commercial and financial appraisal B 125
  engineering and marketing B 123
  military and special vehicles B 124
  D65 rear drive axle B 124
  S62 dead steer front axle B 124
API Standard 5LX Grade X 60 A 184

Bearings
  aerostatic annular porous thrust with tilt C 83
  aerostatic porous rectangular thrust effects of velocity slip, anisotropy and tilt C 179
  steady-state characteristics C 179
  aerostatic thrust, performance prediction C 145
  air journal, inherent compensation in C 275
  capillary-compensated oil-lubricated hydrostatic C 255
  damping and stiffness variation with resistance ratio C 257
  damping sources in rolling element under oscillating conditions C 225
  determination of axial and radial deflections C 277
  displaced centres elliptical, oil-film static and dynamic properties C 159
  dynamic characteristics of C 255
  elastohydrodynamic lubrication of centrally loaded 120° arc partial C 97
  externally pressurized gas journal stiffness and damping of C 25 with porous inserts C 25
  externally pressurized porous gas C 83
  hydrodynamics characteristics A 264
  quadrature stiffness variation with frequency C 258
  rolling, tribology aspects C 1
  rolling element stiffness C 226
  segmented radial A 260
  short bearing load and stiffness characteristics A 265
  silicon carbide product lubricated A 257
  thrust, ceramic A 261
Blockage corrections for rectangular flat plates mounted in open jet wind tunnel C 259
Blue Fox radar B 105
Boiler contract details A 15
Boiler feed make-up water system A 22
Boiler house layout A 10
Boiler plant, two shift operation A 249
Boilers, Yarrow water-tube A 81
Boltzmann–Hamel's equations C 266
Brayton cycle A 150
British engineering, acceleration of change in B 1
British Gas Corporation, national transmission system A 179
Brunel, Isambard Kingdom A 79
Bulk cavitation, recompaction waves induced by C 141
Bunsen burner flare A 160
Burners, premixed A 159
Buses, transmission systems A 97

CAD/CAM A 226, B 35, B 41, B 81, B 101, B 102, B 134, B 135, B 187, B 219, B 237, C 189
  automated production of detail drawings B 193
  avionic components B 101
  case studies B 105
  design drawing offices B 102
  design for manufacture B 187
  effects on design B 105
  hardware B 187
  inspection B 104
  machine shop B 103
  production control B 105
  'Shapes' B 187, B 188, B 193, B 194
  shape elements B 195
  shipbuilding B 219
  tooling constraints and selection B 191
  turning machine constraints and selection B 190
Capital investment
  funding B 137
  in manufacturing industry B 210
Carbon fibre reinforced plastics B 71, B 140
Carbon sealing rings, A 45
Career progression lines for engineers B 153
Cars, supercharging of diesel engines A 113
Cavitation, bulk. *See* Bulk cavitation
Centrifugal pump hydraulic design A 221, A 222
  area ratio A 223, A 230
  design coefficients A 225, A 230
  free vortex A 223, A 228
  inlet design A 223, A 227
  modelling methods A 222, A 223
  non-overloading power curves A 229
  performance uncertainty A 225
  specific speed and suction specific speed A 227, A 230
  through-flow A 225
Ceramic turbine blades C 82
Ceramics A 157
  crack behaviour in C 81
  product lubricated bearings A 257
  properties and applications C 81
Chartered Mechanical Engineers B 152
Closed loop design B 237
Coal combustion
  medium-speed diesel engines A 294
  Stirling engine A 38
Coal feed to boiler unit A 18
Coal feeders B 111
  design details B 114
  Generation 2000 B 113, B 114
  performance results B 115
Coal handling plant A 17
Coal off-loading and storage A 18
Coanda effect in waste gas flares A 159
Coanda tulip HP/LP flare A 161
Collapse model in propagation buckling A 144
Combustion chamber
  insulated A 199
  surface temperature A 207
Combustor, Stirling engine A 108, A 111

© IMechE 1983

Commercial aspects of engineering operations B 155
Competitiveness improvement B 137, B 139
Compressed air, energy use A 269
Compressor characteristics A 189
Compressor installations A 189
Compressor stations A 189
Compressors
  aftercooling A 272
  autostop A 274
  axial C 173
  control system A 273, A 274
  efficiency of A 271
  energy consumption A 269, A 275
  modulating and off-loading A 273
  multi-set control A 275
  oil flow A 272
  oil grade A 272
  packaged A 269
  power balance A 271
  pressure drops A 272, A 276
  siting A 276
  slide valve A 274
Computer aided design. *See* CAD/CAM
Computer Aided Design Centre (CADC) B 35
Computer aided engineering. *See* CAD/CAM
Computer aided manufacture. *See* CAD/CAM
Computer assisted modelling B 255, B 261
Computer evaluation of slip line fields for rolling A 277
Computer numerically controlled (CNC) machine tools B 261
Computer numerically controlled (CNC) turning and machining centres B 255
Computer simulation of free surface disturbance A 87
Computers
  engine hot test B 28
  gas transmission control system A 194
  high-speed links B 32
  maintenance B 27
  management report generation B 28
  monitoring B 27
Computervision Designer V CAD/CAM system B 219
Continuous describing function model B 237
Control systems, power station single unit A 24
Conveyors, foundry core/mould handling B 13
Cooling system, hydraulic gradients for A 22
Cooling water system, power station single unit A 20
Control models, optimal B 239
Corrosion control in pipelines A 186
Cost escalation between direct tasks B 134
Costs, overhead B 134
Crack behaviour in ceramics C 81
Crack opening tip displacement (COTD) tests A 185
Crank angle C 22
Crank-pin force C 22
Crankshaft bearing force C 22
Creeping obsolescence B 132
Cross-over pressure of sleeve arrestors A 145
Cushing's theory, review of C 144
Cuss I barge A 83
Cylinder wall temperature fluctuation A 207

Damping of externally pressurized gas journal bearings with porous inserts C 25
Damping coefficients associated with squeeze-film isolator C 199
Data collection process B 33
Data collection requirements B 28
Data collection techniques B 30, B 34
Data files, key components B 257
Data handling, group method of (GMDH) B 242
Data transmission B 31
Databases, key machined components selection B 255
Deaerator location, power station single unit A 23
Design in acceleration of change B 3
Design Council B 3
Dexion steel shelving B 91
Diesel engines
  cars A 113
  conversion to Stirling engines A 39, A 41
  divided-chamber, heat losses from C 151
  insulation and engine performance A 200
  limited-cooled performance potential A 197
  medium-speed
    adiabatic components A 291
    brake mean effective pressure A 290
    design and development trends A 287
    fuels A 287, A 292, A 294
    general developments A 289
    manifold system developments A 293
    mean piston speed A 289
    pollution and emissions A 293
    stroke lengthening A 290
    turbocharger developments A 292
  pressure-wave supercharging A 113
  turbocharged A 27, A 197
Differential compound engine A 103, A 209
  for 38–40 ton truck A 214
  microprocessor control A 209
Differential gear C 1
Differentially supercharged engine A 102
Digital frequency transducer A 94
Discharge coefficient, nozzle shape effect on C 9
Discrete models B 238
Dispersion strengthened mechanical alloys C 80
Distributed intelligence interactive draughting package (DIAD) B 35
Drilling unit for arctic waters A 90
Drilling vessel, Mohole A 83
Drop weight tear test (DWTT) A 185
Duct program for engine design B 39
Ducts, stresses in internally pressurized thin rectangular prismatic C 71
Dust handling plant A 19
Dynamic analysis of mechanical systems C 17
Dynamic analysis of planar mechanisms with multiple clearances C 89

Eastern Steam Navigation Company A 80
Economic reform
  and activities of SIMP B 159
  in theory and practice B 158
  science and technology in the framework of B 159
Education in acceleration of change B 3
Ejectors, air-driven at elevated temperatures C 167
Elastic analysis of thin rectangular duct C 71
Electric motors a.c. *See* a.c. motors
  fractional-horsepower construction B 127
Electrical installations
  power station auxiliaries A 24
  power station single units A 16
Electricity generation, hydro turbines for A 91
  See also Generators, Power stations
Elliptical contacts, elastohydrodynamic lubrication C 209
Employee participation and consultation B 6
Energy use
  compressed air A 269
  material processing B 24
  vehicle manufacture B 22
Engine design, Duct program for B 39
Engine hot test
  computers B 28
  monitoring B 33
  reporting B 34
Engine, RB211 turbofan A 149
Engine, rotary A 157
Engine transmission systems. *See* Transmission systems
Engineered product examples B 131
Engineering and public policy B 155
Engineering Council B 152
Engineering industry
  acceleration of change in B 1
  opportunities for growth B 2
  revival programme ingredients B 131
Engineering management B 143
  and engineering profession B 152
  challenges facing B 146
  definition of B 143
  in manufacturing industry B 145
  in the future B 154
  post-graduate diploma B 150
  professional development in B 151
Engineering operations, management of B 155
Engineering Management Division B 143, B 152, B 155
Engineering profession B 152, B 217
Engineers
  career progression lines for B 153

© IMechE 1983

managerial tasks of B 143
preparation for management B 148
status of B 143
Environmental considerations, pipelines A 187
EPROM A 93
Equations of motion
aircraft C 270, C 272
analytical and vectorial methods of synthesis C 265
Excess cost problems B 133
Exhaust emissions, medium-speed diesel engines A 293
Exhaust gas recirculation A 121
Exhaust gases, PWS Comprex supercharger A 121

Fan technology, aero engines A 154
Fasteners, manufacture of aerospace B 177
Fatigue failure in powder Astroloy C 80
Flares, waste gas A 159
Flexible manufacturing systems B 133, B 134, B 135
Flow
in different regimes of elastohydrodynamic lubrication C 97
in bearing clearance C 26
in porous matrix (restrictor) C 25
Fluid flow A 172, A 174. *See also* Heat transfer
Fluid inertia number A 264
Fluid motion following reflection of underwater shock wave C 141
Fluidized bed coal combustor, Stirling engine A 245
Fluid streams, physical properties A 171
Ford Cargo truck range B 61
aerodynamic development B 63
brake systems B 66
cab B 65, B 67
driver's seat B 65
instrument panel B 65
noise levels B 66
operating costs B 61
reliability and durability B 63
steering effort B 66
Forging, aerospace fasteners B 178
FORTRAN A 93, A 95
Foundry cores/moulds automatic handling and storage B 7, B 9
automatic storage and retrieval machine B 12
conveyors B 13
financial implications B 17
system control computer B 16
system failures B 17
Foundry modernization programme B 7
France, high speed trains B 44
Franchot–Stirling engine A 236
Froude, R E A 82
Froude, W A 82
Fuel consumption
down-sizing effect A 118
down-sizing gain A 119
part-load A 116
PWS Comprex supercharger A 120
specific A 151, A 204
Fuel efficiency A 153
aero engine A 150

Fuels
gaseous
diesel engine A 288
medium-speed diesel engines A 295
heavy, medium-speed diesel engines A 294
liquid, diesel engine A 288
medium-speed diesel engine trends A 287
solid, diesel engine A 288
water–fuel emulsions A 292

Gas demand
daily pattern of A 181
requirements A 179
Gas generator thermal efficiency improvement A 153
Gas handling plant A 194
Gas industry
growth of A 182
since nationalization A 181
Gas reception terminals A 188
Gas resources, under-sea A 89
Gas terminal development A 189
Gas transmission
control system A 194
current development A 195
future developments A 196
national system development A 179
quality, safety and the environment A 182
Gas turbine components A 150
Gas turbines
early development A 149
fuel efficiency A 150
Gear shaping cutter profile, effect of top-relief and rake angles C 249
Gear shaping cutters
pinion-type C 249, C 252, C 253, C 254
rack-type C 249, C 250, C 251
Gearboxes
bearing arrangements in C 1
triple epicyclic four-clutch six-ratio change-speed C 127; (corrigenda) C 212
advantages of C 136
design C 133
examples C 135
structural analysis of C 129
topology C 135, C 137–140
torque C 133, C 134, C 135
transmission design method C 133
viability of C 129, C 136
Gears
bevel C 213
epicyclic C 128, C 136
split-torque epicyclic C 213
Generalized principle of angular momentum C 266
Generator units, two-shift operation A 250
Generators, water turbine driven A 91
Glomar Challenger A 88
Governors
and sequence controller integration A 93
double derivative A 92
Graphical number control (GNC) B 37
Great Britain SS A 79, A 80
Great Eastern SS A 79, A 80, A 82
Great Western SS A 79, A 80
Grinding
aerospace fasteners B 178
continuous dress creep feed B 231
Group method of data handling (GMDH) B 242
Gyropendulum C 109
design and assembly C 112
experimental procedures and results C 112, C 113, C 115
forced vibration C 111
free motion C 110
P-configuration C 109, C 110
response to parametric excitation C 233
response to vertical harmonic displacement C 233
stability considerations C 235
types of motion C 109
V-configuration C 109, C 111
Gyroscope moving under gravity C 109

Hardening, non-linear anisotropic C 31
Havelock, T H A 82
Heat exchangers
air cooled A 51
coiled tube A 55
double pipe A 56
graphite A 56
lamella A 54
plate A 52
plate fin A 55
scraped surface A 57
selection A 51, A 59, A 60
shell and tube A 58, A 59, A 171
design and performance A 175
examples of selection A 66–69
mechanical data A 62
process data A 59
processes occurring in A 171
specification A 59–66
sensitivity to uncertainties in physical properties A 171
TEMA standards A 66–69
spiral plate A 53
Stirling engine A 108, A 111
Heat losses from divided-chamber diesel engine C 151
Heat pump, Stirling engine A 235
Heat transfer. *See also* Heat exchangers
impinging air jet C 7
influence of nozzle slot width C 13
normalized C 14
nozzle shape on C 11
stagnation point C 11, C 13
Stirling engine A 38
Heat transfer coefficient C 12, C 14, A 171, A 173
Heat transformers A 71
absorption and resorption cycles A 71, A 73
basic principle A 71
industrial applications A 75
single-stage A 72
two stage A 73
Thermosorb A 73
Helicopter transmission with split-torque epicyclic and bevel drive stages C 213

© IMechE 1983

Hertzian contact, stresses beneath sliding, normally loaded C 53, C 282
High speed trains, world survey B 43
High temperature structural materials C 75
  definition C 75
  historic development philosophy C 75
  philosophy for the future C 79
  applications of C 76, C 80, C 81
Hornet HMS A 81
Human operator control models B 237
Human operator modelling B 242
Hydraulic components, fluid borne pressure ripple characteristics B 247
Hydraulic design, centrifugal pumps. *See* Centrifugal pump hydraulic design
Hydraulic equipment, noise levels in B 247
Hydraulics Research Station A 85
Hydro turbines
  for electricity generation A 91
  governing requirements of A 91
  maintenance controls A 94
  microcomputer control A 91
Hydrostatic testing of pipelines A 186
Hydrostatic transmission A 245

Ice-affected area research A 89
IFP Thermosorb process A 73
Impregnants
  mechanical carbon sealing rings A 45
  technical specifications A 48
Improvement programmes B 139
Indair flares A 160
Industrial democracy B 6
Industrial relations in acceleration of change B 6
Information systems
  plant floor B 27
  via programmable controller/computer networks B 27
  see also Management information systems
Inherent compensation in air journal bearings C 275
Innovation, management of B 147, B 155
Innovation matrix B 147
Inspection of pipelines A 187
Institute of Oceanographic Sciences A 83
Institution of Mechanical Engineers
  academic requirements for corporate membership B 149
  technical structure B 152
Instrumentation, power station single unit A 24
Intake systems, resonant (Cser type) A 27
International competition B 148
International phase of ocean drilling (IPOD) A 83
Iron mining operations, Mount Whaleback B 203
Iron ore deposit, Mount Newman B 197

Japan
  automotive industry performance B 19
  Stirling engine A 107
Jets, heat transfer of impinging air C 7
Joint air/sea interaction (JASIN) project A 88
Joint oceanographic institutions deep earth sampling (JOIDES) project A 83
Joule cycle A 150

Kentfield shell displacer A 241, A 242

Labour costs B 133
Lagrangian mechanics C 17
Learned society activities B 149
Load evaluation in hot flat rolling from slip line fields A 277
Locomotives
  coal-burning Stirling A 42, A 233, A 239
  diesel–electric conversion to Stirling engine A 242, A 244
Low-level heat upgrading A 71
Lubricants
  in rolling bearings C 4
  isoviscous C 99
  variable viscosity C 99
  water A 41, A 236
Lubrication
  elastohydrodynamic C 226
    of centrally loaded 120° arc partial bearing in different flow regimes C 97
    of elliptical contacts with rolling along major axis C 209
  of rigid–ellipsoidal solids by piezo-viscous fluid C 43
  piezo-viscous fluid, rigid solid regime C 43
  see also Bearings; silicon carbide product lubricated
LNG storage A 191

Machine monitoring systems B 28
Machine tool construction
  design B 183
  manufacturing effectiveness B 185
  resultant technology B 184
  'S' (or system) type B 183
  specification characteristics B 184
Machine tools, selection based on key machined components B 261
Machined components, database selection of B 255
Magnus field A 84
Maintenance
  computer support B 27
  power station single unit A 25
Management, preparation of engineers for B 148
Management education and development B 155
  weaknesses in B 209
Management information systems B 134, B 135
Management of engineering operations B 144, B 145, B 155
Management of innovation B 147, B 155

Management studies B 218
Management training B 149
Managerial economics and techniques B 155
Managerial tasks of engineers B 143
Managers
  developing in the 1980s B 209
  education for B 217
  profile of B 216
Manhattan, ice-breaking tanker A 90
Manufacturing effectiveness B 131
Manufacturing industry
  capital investment in B 210
  engineering management in B 145
  future of B 214
  needs and initiatives B 214
  performance of B 209
  productivity in B 209
Manufacturing obsolescence B 132
Manufacturing performance B 131
Mardair flares A 167
Marine research, innovation and growth in A 79
Marine resources research A 88
Marine technology research programme A 86
Marine transport research activities A 89
Martini/Ringbom–Stirling engine A 238
Martini–Stirling engine A 238, A 239
Material costs B 133
Mechanical systems, dynamic analysis of C 17
Mergers in acceleration of change B 5
Microcomputers in hydro turbine control A 91
Microprocessors in differential compound engine control A 209
Mineral deposits. *See* Mount Newman
Mineral resources, under-sea A 89
Mohole drilling vessel A 83
Mohole project A 83, A 88
Mohorovicic discontinuity A 83
Monitored Professional Development Scheme B 150
Monitoring
  computer functions B 27
  engine hot test B 33
Mount Newman iron ore deposit B 197
Mount Whaleback
  iron mining operations B 203
  iron ore deposit B 197

National gas transmission system development A 179
National Engineering Laboratory A 85
National Maritime Institute Limited A 82, A 85
National Science Foundation A 83
Nationalized industries in acceleration of change B 3
Natural Environment Research Council (NERC) A 85
New technology B 135
  aerospace fasteners B 180
  attitude of employees to B 5
Noise, Stirling engine A 111
Noise field prediction from arbitrary vibrating machine C 189
Noise generation and transmission, fluid borne B 247

© IMechE 1983

Noise levels in hydraulic equipment B 247
Non-destructive testing of pipelines A 186
Non-linear models B 241
North Sea platform designs A 84
Nozzle shape effect
on discharge coefficient C 9
on heat transfer C 11
Nozzles, slot, effect of geometry on heat transfer or air jet C 7
Nutation motion C 109

Obsolescence symptoms B 132
Ocean-related activities, innovation and growth in A 79
Offshore oil activities A 82
Offshore platforms A 84
model testing A 86
Offshore research A 86
Offshore Technology Conference A 89
Oil drilling/production platforms A 84
Oil-film dynamics, role of synchronous excitation for identifying C 199
Oil films, static and dynamic properties in displaced centres elliptical bearings C 159
Oil resources, under-sea A 89
Overhead line equipment, pantograph interaction with C 61

Pantograph aerodynamics C 66
Pantograph dynamic system C 62
Pantograph, high-speed C 66
Pantograph interaction with overhead line equipment C 61
Pantograph multiple operation C 68
Pantograph/overhead system optimization C 65
Peak to valley parameter measurement for surface finish C 205
Photogrammetry A 125
case study A 131
configuration of cameras A 127
engineering interpretation A 128
in piping design A 125, A 297
metric A 126
system development A 128
Piezo-viscous fluid, lubrication of rigid–ellipsoidal solids by C 43
Pipelines
corrosion control A 186
environmental considerations A 187
hydrostatic testing A 186
laying of sub-sea A 85, A 139
materials for high pressure gas A 184
non-destructive testing A 186
on-line inspection A 187
propagating buckling in sub-sea A 139
Piping design, photogrammetry in A 125, A 297
Piston rings, Stirling engine A 108, A 111
Planar mechanisms with multiple clearance, dynamic analysis of C 17, C 89
Plastic deformation of work-hardening materials C 31
Plastic hinge region analysis A 141
Polish Society of Mechanical Engineers and Technicians (SIMP) B 157
Pollution, medium-speed diesel engines A 293
Polysurf three-dimensional surface programs B 38
Port Hedland, construction of B 199
Post-graduate Diploma in Engineering Management B 150
Powder materials, fatigue failure in Astroloy C 80
Powder metallurgy, high temperature materials C 80
Power stations
designed and built as single units A 1
basic concept A1, A 2
boiler A 10, A 15, A 22, A 23
coal plant A 17, A 18, A 19, A 20
construction A 7, A 10, A 11
costs A 9, A 10, A 14
contracts A 15
control and instrumentation A 24
CW system A 20
deaerator A 23
design A 5, A 12
electrical systems A 16, A 24, A 26
layouts A 12, A 18
maintenance A 25
plans and elevations A 3, A 7
plant procurement A 6
power consumption, auxiliary A 25
RC construction A 16
site development A 6
support structure A 16
turbine house A 12
turbo-generator A 8
two-shift operation A 247
future developments A 247
instrumentation and control A 250
operational development A 251
Precession motion C 109
Precipitation hardened alloys C 81
Private sector in acceleration of change B 5
Product design B 81, B 132, B 146, B 147
a.c. motors B 162
avionic components B 105
conveyorized coal feeder B 114
steel shelf B 93
tennis racket B 72
Productivity in manufacturing industry B 209
Propagating buckles in sub-sea pipelines A 139
Propagation pressure
rigid–perfectly plastic solution for A 140
strain hardening model for A 141
theoretical and experimental results for A 143, A 146
Propeller efficiency at high flight speeds A 153
Propulsive efficiency, definition A 151
Pumps
axial-piston C 239
centrifugal, hydraulic design. *See* Centrifugal pump hydraulic design
pressure ripple characteristics of B 247
PWS Comprex exhaust-driven supercharger A 113

Quasi-linear function model B 237
Quick-return motion mechanisms C 90

Railways
light rail vehicles B 55
future options B 58
historical review B 55
operating requirements B 57
passenger and marketing requirements B 56
technical considerations B 57
types of service B 55
urban rail vehicles B 49, B 50
future trends B 52
recent developments B 51
urban railway development B 49
urban railway rolling stock B 50
see also High speed trains; Locomotives
Rankine cycle engine compounding A 205
Recompaction waves induced by bulk cavitation C 141
Regenerative cycle, aero engines A 156
Research, marine, historic view of A 79
Revival programme ingredients B 131
Reynolds cavitation boundary conditions C 47
Reynolds equation A 263, A 264
Reynolds number, C 7, C 13, C 15, C 97, C 151
Ringbom–Stirling diesel conversion A 43
Ringbom–Stirling diesel engine A 44
Ringbom–Stirling engine A 41, A 42, A 237, A 238
Ringbom–Stirling locomotive A 43
Robotics B 134
Robots, world population B 215
Rod seal, Stirling engine A 108, A 111
Rolling, hot flat, load and torque evaluation from slip line fields A 277
Rolls–Royce RB211 civil turbofan engine A 149
Rotary engines, constant volume cycle A 157

Salt cavity storage A 193
Sampled-data models B 238
Science and Engineering Research Council (SERC) A 85–87
Science and technology in the framework of economic reform B 159
Sea Harrier VTOL aircraft B 237
Seakeeping experiments A 86
Sealing rings, mechanical carbon A 45
Sequence control, vehicle build B 169
Sequential controller, hydro turbine A 93
Ship form, early experiments on A 82
Ship resistance research A 82
Shipbuilding industry, CAD/CAM system B 219
Shock-wave compression and expansion cycles A 157
Siemens–Stirling engine A 37
Silicon carbide product lubricated bearings A 257
Skills improvement B 139
Sleeve arrestors, cross-over pressure of A 145

© IMechE 1983

Sliding spherical contact, stresses beneath C 53; (errata) C 282
Slip line fields for hot flat rolling A 277
Slipper equilibrium in axial-piston pumps C 242
Slipper surface geometry C 240
Slippers in axial-piston pumps C 239
Society and technology relationship B 148
Sodium heat pipe, Stirling engine A 246
Solar energy A 89
Specific fuel consumption A 151, A 204
Squeeze-film isolator, damping coefficients associated with C 199
Steam generating equipment
  capital investment B 118
  industrial relations B 120
  management systems B 119
  modernization programme approach B 117
  programme results B 121
Steam turbine blade and wheel vibration measurements C 117
  distribution parameters C 120
  dynamic measurements C 124
  use of experimental measurements for predictive purposes C 122
Steam turbines, two-shift operation A 247
Stedair flares A 169
Steel production, Japanese achievements B 24
Steel shelves B 91
  manufacturing section B 95, B 98
  materials used B 98
  packaging B 96, B 100
  painting B 96, B 100
  pre-treatment B 96, B 99
  processing section B 96, B 99
  product concept B 93, B 97
  production line B 93, B 95, B 97, B 98
Stiffness of externally pressurized gas journal bearings with porous inserts C 25
Stirling engine
  air as working fluid A 236
  applications A 37, A 39, A 233
  coal-burning power systems A 233, A 239
  coal-fired locomotives A 37, A 42, A 233, A 239
  combustor A 108, A 111
  construction A 107
  cost aspects A 39
  diesel conversion to A 39, A 41
  displacer drives A 237
  experimental development A 107
  fluid switching valve A 240
  fluidized bed coal combustor A 245
  heat balance A 110
  heat exchangers A 108, A 111
  heat pump A 235
  heat transfer analysis A 245
  heat transport systems A 38, A 239
  kinematic displacer drives A 238, A 241
  large A 37
  marine A 107
  noise A 111
  operating parameters A 108
  performance A 108
  piston and displacer coupling A 237
  piston rings A 108, A 111
  pressure balanced systems A 235
  rod seal A 108, A 111
  single-acting A 39
  sodium heat pipe A 246
  split-Stirling engine A 234
  steam injection for maximum power A 40
  thermal efficiency A 107
  two-phase two-component working fluids A 237
  vibration A 111
  water as lubricant A 41, A 236
Stress rupture properties for dispersion strengthened, precipitation hardened and mechanically alloyed materials C 81
Stresses beneath sliding spherical contact C 53; (errata) C 282
Stresses in internally pressurized thin rectangular prismatic duct C 71
Structural materials, high temperature. *See* High temperature structural materials
Superchargers, PWS Comprex exhaust-driven A 113
Supercharging
  attainable degree of A 114
  criteria for vehicle response A 114
  engine characteristics comparison A 115
  pressure wave A 113
Surface finish, peak/valley parameter measurement C 205
Synchronous excitation, identification of linearized squeeze-film dynamics C 199
System communications B 32
System report capability B 33
SWATH (small waterplane area twin hull) A 88

Technology and society relationship B 148
Tennis racket
  carbon fibre reinforced thermoplastic B 140
  design, development and manufacture B 71
  manufacture B 78, B 79
  engineering aspects B 74
  marketing B 78
  materials used B 79
  moulds and tooling B 76
  product design B 72, B 77
Thermal barrier coatings C 80, C 81, C 82
Three-dimensional surface programs B 38
Time series models B 241
Torque converter A 102, A 103
Torque evaluation in hot flat rolling from slip line fields A 277
Torsion, reversed yielding experiments in C 38
Trades unions in acceleration of change B 5
Training
  in acceleration of change B 3
  management B 149
  production line personnel B 97
Transmission systems
  basis for comparison of different systems A 97
  continuously variable A 97, A 103, A 209
  for heavy vehicles A 97
  hydrostatic A 244
  nine-speed A 99
  seven-speed A 100
  shunt hydrostatic A 101
  stepped A 99, A 100
  two-speed A 102
  see also Differential compound engine; Helicopter transmission
Tribology, rolling bearings C 1
Trolley wire equipment C 63
Trucks, transmission systems A 97
Turbine blades, prototype ceramic C 82
Turbine house design and construction A 12
Turbines, hydro. *See* Hydro turbines
Turbocharging systems
  for diesel engines A 27
  variable geometry A 27
Turbo-compounding model A 199
Turbo-compounding system A 197, A 203
Turbo-generator contract details A 15

Underwater shock wave, fluid motion following reflection of C 141
Unit cost reduction B 137
United Kingdom, automotive industry performance B 19
United States, automotive industry performance B 19
University Grants Committee A 85

VADER (vacuum arc double electrode remelting) C 80
Vehicle build sequence control B 169
Vibration
  noise field prediction from arbitrary machine C 189
  steam turbine blade and wheel measurements C 117
  Stirling engine A 111

Wave energy device A 89
Wealth generation B 131
Welding
  automatic techniques A 185
  hyperbaric A 87
West Germany, high speed trains B 44
Western Australia mineral developments B 197
Western Europe, automotive industry performance B 19
Wheel bearing arrangements C 3
Wind tunnel tests, blockage corrections for rectangular flat plates C 259
Work-hardening and translation laws C 38
Work-hardening materials, plastic deformation C 31
Wrist-pin force as affected by revolute clearances *vs* crank angle C 22

Yarrow, A F A 80
Yield function for non-linear work-hardening materials C 31

© IMechE 1983